



20510452\_1(8.21.08).TXT  
SEQUENCE LISTING

<110> The University of Newcastle  
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Fogg, Mark  
Pearl, Laurence

<120> DNA POLYMERASES

<130> P89103PWO

<140> PCT/GB2003/001623

<141> 2003-04-15

<160> 33

<170> PatentIn version 3.1

<210> 1

<211> 776

<212> PRT

<213> Unknown

<220>

<223> variant derived from Pyrococcus furiosus Pfu-Polymerase

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Met Ala Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro Val  
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Arg Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
35 40 45

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Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
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Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr  
85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
100 105 110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
290 295 300

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Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
Page 3

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550

555

560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
 565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
 595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
 610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
 625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
 645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
 660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
 675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
 690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
 705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
 725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
 740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
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Ser Trp Leu Asn Ile Lys Lys Ser  
 770 775

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&lt;211&gt; 775

&lt;212&gt; PRT

<213> *Pyrococcus furiosus*

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Met Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro Val Ile  
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Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp Arg  
 20 25 30

Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys Ile  
 35 40 45

Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg  
 50 55 60

Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile  
 65 70 75 80

Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr Ile  
 85 90 95

Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr  
 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro  
 115 120 125

Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu Thr  
 130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met Ile  
 145 150 155 160

Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn Ile  
 165 170 175

Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile Lys  
 180 185 190

Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val Thr  
 195 200 205

Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala Glu  
 210 215 220

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Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro Lys  
225 230 235 240

Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg Ile  
245 250 255

His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro Thr  
260 265 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys Glu  
275 280 285

Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu Asn  
290 295 300

Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr Tyr  
305 310 315 320

Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg Leu  
325 330 335

Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu  
340 345 350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val Ala  
355 360 365

Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu Ser  
370 375 380

Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu Asn  
385 390 395 400

Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile Thr  
405 410 415

His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn Tyr  
420 425 430

Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro Gly  
435 440 445

Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys Ile  
450 455 460

Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu Leu  
465 470 475 480

20510452\_1(8.21.08).TXT

Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr Gly  
485 490 495

Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu  
500 505 510

Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys Glu  
515 520 525

Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp Gly  
530 535 540

Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys Lys  
545 550 555 560

Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu Leu  
565 570 575

Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys  
580 585 590

Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg Gly  
595 600 605

Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln  
610 615 620

Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu Ala  
625 630 635 640

Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu Ile  
645 650 655

Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu His  
660 665 670

Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu Ala  
675 680 685

Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile Val  
690 695 700

Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu Glu  
705 710 715 720

Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn  
Page 7

725

730

735

Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr Arg  
 740 745 750

Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr Ser  
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Trp Leu Asn Ile Lys Lys Ser  
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&lt;210&gt; 3

&lt;211&gt; 776

&lt;212&gt; PRT

&lt;213&gt; Unknown

&lt;220&gt;

&lt;223&gt; variant derived from Pyrococcus furiosus Pfu-Polymerase

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Met Ala Ile Leu Asp Val Asp Ala Ile Thr Glu Glu Gly Lys Pro Val  
 1 5 10 15

Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp  
 20 25 30

Arg Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
 35 40 45

Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
 50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
 65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr  
 85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
 100 105 110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
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Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
370 375 380

20510452\_1(8.21.08).TXT

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
545 550 555 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
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Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
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Ser Trp Leu Asn Ile Lys Lys Ser  
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<212> PRT

<213> Unknown

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<223> variant derived from Pyrococcus furiosus Pfu-Polymerase

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Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp  
20 25 30

Arg Thr Phe Arg Pro Ala Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
Page 11

35

40

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Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr  
85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
100 105 110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
275 280 285

## 20510452\_1(8.21.08).TXT

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
 290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
 305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
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Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
 340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
 355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
 385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
 435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
 465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
 500 505 510

Glu ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
 530 535 540

## 20510452\_1(8.21.08).TXT

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
545 550 555 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser  
770 775

<210> 5

&lt;211&gt; 776

&lt;212&gt; PRT

&lt;213&gt; Unknown

&lt;220&gt;

&lt;223&gt; Variant derived from Pyrococcus furiosus Pfu-Polymerase

&lt;400&gt; 5

Met Ala Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro Val  
 1 5 10 15

Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp  
 20 25 30

Arg Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
 35 40 45

Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
 50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
 65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Gln Pro Thr  
 85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
 100 105 110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
 115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
 130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
 145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
 165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
 180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
 Page 15

195

200

205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
 210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
 225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
 245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
 260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
 275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
 290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
 305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
 325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
 340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
 355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
 385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
 435 440 445

## 20510452\_1(8.21.08).TXT

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
 465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
 500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
 545 550 555 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
 565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
 595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
 610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
 625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
 645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
 660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
 675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
 690 695 700

20510452\_1(8.21.08).TXT

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser  
770 775

<210> 6

<211> 776

<212> PRT

<213> Unknown

<220>

<223> variant derived from Pyrococcus furiosus Pfu-Polymerase

<400> 6

Met Ala Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro Val  
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Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp  
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Arg Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
35 40 45

Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Arg Pro Thr  
85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
100 105 110

20510452\_1(8.21.08).TXT

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
Page 19

355

360

365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
 385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
 435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
 465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
 500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
 545 550 555 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
 565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
 595 600 605

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Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
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Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser  
770 775

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<211> 776

<212> PRT

<213> Unknown

<220>

<223> variant derived from Pyrococcus furiosus Pfu-Polymerase

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Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp  
20 25 30

Arg Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
35 40 45

Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr  
85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
100 105 110

Tyr Asp Arg Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
 275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
 290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
 305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
 325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
 340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
 355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
 385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
 435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
 465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
 500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
 Page 23

515

520

525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
 545 550 555 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
 565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
 595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
 610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
 625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
 645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
 660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
 675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
 690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
 705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
 725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
 740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
 755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser  
770 775

<210> 8

<211> 776

<212> PRT

<213> Unknown

<220>

<223> Variant derived from Pyrococcus furiosus Pfu-Polymerase

<400> 8

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Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp  
20 25 30

Arg Thr Phe Arg Pro Ala Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys  
35 40 45

Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val  
50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro  
65 70 75 80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr  
85 90 95

Ile Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu  
100 105 110

Tyr Asp Gln Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu  
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met  
145 150 155 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn  
165 170 175

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Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile  
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val  
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala  
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu Pro  
225 230 235 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly Arg  
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu Pro  
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro Lys  
275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly Glu  
290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala Thr  
305 310 315 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser Arg  
325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn  
340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val  
355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu  
370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu  
385 390 395 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile  
405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn  
420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro  
 435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys  
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile Leu  
 465 470 475 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe Tyr  
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys Ala  
 500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp Lys  
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr Asp  
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys Lys  
 545 550 555 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly Leu  
 565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr  
 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr Arg  
 595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr  
 610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu Glu  
 625 630 635 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr Glu  
 645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro Leu  
 660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys Leu  
 Page 27

675

680

685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr Ile  
 690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu  
 705 710 715 720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu  
 725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr  
 740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr  
 755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser  
 770 775

&lt;210&gt; 9

&lt;211&gt; 2328

&lt;212&gt; DNA

&lt;213&gt; Unknown

&lt;220&gt;

<223> Variant derived from *Pyrococcus furiosus* Pfu-Polymerase

&lt;400&gt; 9

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gctctgctgc gtgacgactc taaaatcgaa gaagttaaaa aaatcaccgg tgaacgtcat	180
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gttagagaac atccagcagt tgtggacatc ttcgaatacg atattccatt tgcaaagaga	360
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tacgttgagg ttgtatcaag cgagagagag atgataaaga gatttctcag gattatcagg	600
gagaaggatc ctgacattat agttacttat aatggagact cattcgactt cccatattta	660

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&lt;210&gt; 10

&lt;211&gt; 2328

&lt;212&gt; DNA

&lt;213&gt; Unknown

&lt;220&gt;

<223> Variant derived from *Pyrococcus furiosus* Pfu-Polymerase

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ccagcggtagc ttaggatatt ggagggattt ggatacagaa aggaagacct cagataccaa	2280
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<210> 11

<211> 2325

<212> DNA

<213> Unknown

<220>

<223> Variant derived from Pyrococcus furiosus Pfu-Polymerase

<400> 11

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gctctgctgc gtgacgactc taaaatcgaa gaagttaaaa aaatcaccgg tgaacgtcat	180
ggaaagattg tgagaattgt tgatgtagag aagggtgaga aaaagtttct cggcaagcct	240
attaccgtgt ggaaacttta tttggaacat cccaagatg ttcccactat tagagaaaaa	300
gttagagaac atccagcagt tgtggacatc ttcgaatacg atatttttgc aaagagatac	360
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gttgagggtt tatcaagcga gagagagatg ataaagagat ttctcaggat tatcaggag	600
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agtggagaga	accttgagag	agttgccaaa	tactcgatgg	aagatgcaaa	ggcaacttat	960
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gactatagac	aaaaagcgat	aaaactctta	gcaaattcct	tctacggata	ttatggctat	1500
gcaaaagcaa	gatggtactg	taaggagtgt	gctgagagcg	ttactgcctg	gggaagaaag	1560
tacatcgagt	tagtatggaa	ggagctcgaa	gaaaagtttg	gatttaaagt	cctctacatt	1620
gacactgatg	gtctctatgc	aactatccca	ggaggagaaa	gtgaggaaat	aaagaaaaag	1680
gctctagaat	ttgtaaaata	cataaattca	aagctccctg	gactgctaga	gcttgaatat	1740
gaagggtttt	ataagagggg	attcttcggt	acgaagaaga	ggtatgcagt	aatagatgaa	1800
gaaggaaaag	tcattactcg	tggtttagag	atagttagga	gagattggag	tgaaattgca	1860
aaagaaactc	aagctagagt	tttgagagaca	atactaaaac	acggagatgt	tgaagaagct	1920
gtgagaatag	taaaagaagt	aatacaaaaag	cttgccaatt	atgaaattcc	accagagaag	1980
ctcgcaatat	atgagcagat	aacaagacca	ttacatgagt	ataaggcgat	aggtcctcac	2040
gtagctgttg	caaagaaact	agctgctaaa	ggagttaaaa	taaagccagg	aatggtaatt	2100
ggatacatag	tacttagagg	cgatggtcca	attagcaata	gggcaattct	agctgaggaa	2160
tacgatccca	aaaagcacia	gtatgacgca	gaatattaca	ttgagaacca	ggttcttcca	2220
gcggtactta	ggatattgga	gggatttgga	tacagaaagg	aagacctcag	ataccaaaag	2280
acaagacaag	tcggcctaac	ttcctggctt	aacattaata	aatcc		2325

&lt;210&gt; 12

&lt;211&gt; 130

&lt;212&gt; PRT

&lt;213&gt; Thermococcus gorgonarius

&lt;400&gt; 12

Met Ile Leu Asp Thr Asp Tyr Ile Thr Glu Asp Gly Lys Pro Val Ile  
1 5 10 15Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Asp Tyr Asp Arg  
20 25 30Asn Phe Glu Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile  
35 40 45Glu Asp Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Thr Val Arg  
50 55 60Val Val Arg Ala Glu Lys Val Lys Lys Lys Phe Leu Gly Arg Pro Ile  
65 70 75 80Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile  
85 90 95Arg Asp Lys Ile Lys Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr  
100 105 110Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro  
115 120 125Met Glu  
130

&lt;210&gt; 13

&lt;211&gt; 103

&lt;212&gt; PRT

&lt;213&gt; unknown

&lt;220&gt;

&lt;223&gt; Family B DNA polymerase encoded by RB69 bacteriophage

&lt;400&gt; 13

Met Lys Glu Phe Tyr Leu Thr Val Glu Gln Ile Gly Asp Ser Ile Phe  
1 5 10 15Glu Arg Tyr Ile Asp Ser Asn Gly Arg Glu Arg Thr Arg Glu Val Glu  
20 25 30

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Tyr Lys Pro Ser Leu Phe Ala His Cys Pro Glu Ser Gln Ala Thr Lys  
35 40 45

Tyr Phe Asp Ile Tyr Gly Lys Pro Cys Thr Arg Lys Leu Phe Ala Asn  
50 55 60

Met Arg Asp Ala Ser Gln Trp Ile Lys Arg Met Glu Asp Ile Gly Leu  
65 70 75 80

Glu Ala Leu Gly Met Asp Asp Phe Lys Leu Ala Tyr Leu Ser Asp Thr  
85 90 95

Tyr Asn Tyr Glu Ile Lys Tyr  
100

<210> 14

<211> 24

<212> DNA

<213> Unknown

<220>

<223> Artificial Primer

<400> 14

ggggatcctc tagagtcgac ctgc

24

<210> 15

<211> 44

<212> DNA

<213> Unknown

<220>

<223> Artificial Template

<400> 15

ggagacaagc ttguatgcct gcaggtcgac tctagcggct aaaa

44

<210> 16

<211> 22

<212> DNA

&lt;213&gt; Unknown

&lt;220&gt;

&lt;223&gt; Artificial Oligodeoxynucleotide

&lt;400&gt; 16

gccccgcggga uatcggcct ta

22

&lt;210&gt; 17

&lt;211&gt; 44

&lt;212&gt; DNA

&lt;213&gt; Unknown

&lt;220&gt;

&lt;223&gt; Artificial Template

&lt;400&gt; 17

ggagacaagc ttgtatgcct gcaggctgac tctagcggct aaaa

44

&lt;210&gt; 18

&lt;211&gt; 131

&lt;212&gt; PRT

&lt;213&gt; Pyrococcus furiosus

&lt;400&gt; 18

Met Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro Val Ile  
1 5 10 15Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His Asp Arg  
20 25 30Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser Lys Ile  
35 40 45Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val Arg  
50 55 60Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro Ile  
65 70 75 80Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr Ile  
Page 35

Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu Tyr  
 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro  
 115 120 125

Met Glu Gly  
 130

<210> 19

<211> 131

<212> PRT

<213> Thermococcus gorgonarius

<400> 19

Met Ile Leu Asp Thr Asp Tyr Ile Thr Glu Asp Gly Lys Pro Val Ile  
 1 5 10 15

Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Asp Tyr Asp Arg  
 20 25 30

Asn Phe Glu Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile  
 35 40 45

Glu Asp Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Thr Val Arg  
 50 55 60

Val Val Arg Ala Glu Lys Val Lys Lys Lys Phe Leu Gly Arg Pro Ile  
 65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile  
 85 90 95

Arg Asp Lys Ile Lys Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr  
 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro  
 115 120 125

Met Glu Gly  
 130

&lt;210&gt; 20

&lt;211&gt; 131

&lt;212&gt; PRT

&lt;213&gt; Pyrococcus kodakaraensis

&lt;400&gt; 20

Met Ile Leu Asp Thr Asp Tyr Ile Thr Glu Asp Gly Lys Pro Val Ile  
 1 5 10 15

Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Tyr Asp Arg  
 20 25 30

Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile  
 35 40 45

Glu Glu Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Val Val Thr  
 50 55 60

Val Lys Arg Val Glu Lys Val Gln Lys Lys Phe Leu Gly Arg Pro Val  
 65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile  
 85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Ile Asp Ile Tyr Glu Tyr  
 100 105 110

Asp Ile Pro Glu Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Val Pro  
 115 120 125

Met Glu Gly  
 130

&lt;210&gt; 21

&lt;211&gt; 131

&lt;212&gt; PRT

&lt;213&gt; Desulfurococcus Tok

&lt;400&gt; 21

Met Ile Leu Asp Ala Asp Tyr Ile Thr Glu Asp Gly Lys Pro Val Ile  
 1 5 10 15

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Arg Val Phe Lys Lys Glu Lys Gly Glu Phe Lys Ile Asp Tyr Asp Arg  
20 25 30

Asp Phe Glu Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile  
35 40 45

Glu Asp Ile Lys Lys Ile Thr Ala Glu Arg His Gly Thr Thr Val Arg  
50 55 60

Val Thr Arg Ala Glu Arg Val Lys Lys Lys Phe Leu Gly Arg Pro Val  
65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile  
85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr  
100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Arg Gly Leu Ile Pro  
115 120 125

Met Glu Gly  
130

<210> 22

<211> 132

<212> PRT

<213> Thermococcus sp. 9°N-7

<400> 22

Met Ile Leu Asp Thr Asp Tyr Ile Thr Glu Asn Gly Lys Pro Val Ile  
1 5 10 15

Arg Val Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Tyr Asp Arg  
20 25 30

Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile  
35 40 45

Glu Asp Val Lys Lys Val Thr Ala Lys Arg His Gly Thr Val Val Lys  
50 55 60

Val Lys Arg Ala Glu Lys Val Gln Lys Lys Glu Phe Leu Gly Arg Pro  
65 70 75 80

Ile Glu Val Trp Lys Leu Tyr Phe Asn His Pro Gln Asp Val Pro Ala  
85 95

Ile Arg Asp Arg Ile Arg Ala His Pro Ala Val Val Asp Ile Tyr Glu  
100 105 110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile  
115 120 125

Pro Met Glu Gly  
130

<210> 23

<211> 131

<212> PRT

<213> Thermococcus litoralis

<400> 23

Met Ile Leu Asp Thr Asp Tyr Ile Thr Lys Asp Gly Lys Pro Ile Ile  
1 5 10 15

Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Leu Asp Pro  
20 25 30

His Phe Gln Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile  
35 40 45

Glu Glu Ile Lys Ala Ile Lys Gly Glu Arg His Gly Lys Thr Val Arg  
50 55 60

Val Leu Asp Ala Val Lys Val Arg Lys Lys Phe Leu Gly Arg Glu Val  
65 70 75 80

Glu Val Trp Lys Leu Ile Phe Glu His Pro Gln Asp Val Pro Ala Met  
85 90 95

Arg Gly Lys Ile Arg Glu His Pro Ala Val Val Asp Ile Tyr Glu Tyr  
100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile Pro  
115 120 125

Met Glu Gly

130

&lt;210&gt; 24

&lt;211&gt; 161

&lt;212&gt; PRT

&lt;213&gt; Methanococcus voltae

&lt;400&gt; 24

Met Asp Leu Asp Tyr Asn Ser Lys Asp Leu Cys Ile Asp Met Tyr Tyr  
 1 5 10 15

Lys Asn Cys Gly Leu Lys Lys Pro Glu Ile Asn Leu Gln Lys Glu Cys  
 20 25 30

Glu Phe Lys Pro Tyr Phe Tyr Val Asp Thr Ser Glu Pro Lys Glu Ile  
 35 40 45

Tyr Asp Tyr Leu Asp Gly Leu Asn Gln Glu Ile Asp Leu Lys Lys Leu  
 50 55 60

Glu Pro Glu Phe Glu Asn Asn Thr Ser Leu Lys Val Gln Asp Leu Ile  
 65 70 75 80

Thr Asn Ile Glu Ile Ile Glu Lys Ile Val Tyr Ser Asp Tyr Ile Leu  
 85 90 95

Asn Gly Lys Asp Ile Ser Glu Val Ser Asp Phe Lys Asn Lys Lys Glu  
 100 105 110

Arg Lys Ile Cys Lys Val Tyr Val Lys Tyr Pro Asn His Val Lys Ile  
 115 120 125

Ile Arg Glu Tyr Phe Lys Glu Phe Gly Lys Ser Tyr Glu Phe Asp Ile  
 130 135 140

Pro Phe Leu Arg Arg Tyr Met Ile Asp Gln Asp Ile Val Pro Ser Ala  
 145 150 155 160

Lys

&lt;210&gt; 25

&lt;211&gt; 132

&lt;212&gt; PRT

<213> *Pyrobaculum islandicum*

&lt;400&gt; 25

Met Glu Leu Lys Val Trp Pro Leu Asp Ile Thr Tyr Ala Val Val Gly  
 1 5 10 15

Ser Val Pro Glu Ile Arg Ile Phe Gly Ile Leu Ser Ser Gly Glu Arg  
 20 25 30

Val Val Leu Ile Asp Arg Ser Phe Lys Pro Tyr Phe Tyr Val Asp Cys  
 35 40 45

Ala Val Cys Glu Pro Ala Ala Leu Lys Thr Ala Leu Ser Arg Val Ala  
 50 55 60

Pro Ile Asp Asp Val Gln Ile Val Glu Arg Arg Phe Leu Gly Arg Ser  
 65 70 75 80

Lys Lys Phe Leu Lys Val Ile Ala Lys Ile Pro Glu Asp Val Arg Lys  
 85 90 95

Leu Arg Glu Ala Ala Met Ser Ile Pro Arg Val Ser Gly Val Tyr Glu  
 100 105 110

Ala Asp Ile Arg Phe Tyr Met Arg Tyr Met Ile Asp Met Gly Val Val  
 115 120 125

Pro Cys Ser Trp  
 130

&lt;210&gt; 26

&lt;211&gt; 131

&lt;212&gt; PRT

<213> *Archaeoglobus fulgidus*

&lt;400&gt; 26

Met Glu Arg Val Glu Gly Trp Leu Ile Asp Ala Asp Tyr Glu Thr Ile  
 1 5 10 15

Gly Gly Lys Ala Val Val Arg Leu Trp Cys Lys Asp Asp Gln Gly Ile  
 20 25 30

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Phe Val Ala Tyr Asp Tyr Asn Phe Asp Pro Tyr Phe Tyr Val Ile Gly  
35 40 45

Val Asp Glu Asp Ile Leu Lys Asn Ala Ala Thr Ser Thr Arg Arg Glu  
50 55 60

Val Ile Lys Leu Lys Ser Phe Glu Lys Ala Gln Leu Lys Thr Leu Gly  
65 70 75 80

Arg Glu Val Glu Gly Tyr Ile Val Tyr Ala His His Pro Gln His Val  
85 90 95

Pro Lys Leu Arg Asp Tyr Leu Ser Gln Phe Gly Asp Val Arg Glu Ala  
100 105 110

Asp Ile Pro Phe Ala Tyr Arg Tyr Leu Ile Asp Lys Asp Leu Ala Cys  
115 120 125

Met Asp Gly  
130

<210> 27

<211> 135

<212> PRT

<213> Cenarchaeum symbiosum

<400> 27

Thr Val Gln Asp Ala Val Glu Ile Pro Pro Ser Leu Leu Val Ser Ala  
1 5 10 15

Thr Tyr Asp Ser Gln Ala Gly Ala Val Val Leu Lys Phe Tyr Glu Pro  
20 25 30

Glu Ser Gln Lys Ile Val His Trp Thr Asp Asn Thr Gly His Lys Pro  
35 40 45

Tyr Cys Tyr Thr Arg Gln Pro Pro Ser Glu Leu Gly Glu Leu Glu Gly  
50 55 60

Arg Glu Asp Val Leu Gly Thr Glu Gln Val Met Arg His Asp Leu Ile  
65 70 75 80

Ala Asp Lys Asp Val Pro Val Thr Lys Ile Thr Val Ala Asp Pro Leu  
85 90 95

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Ala Ile Gly Gly Thr Asn Ser Glu Lys Ser Ile Arg Asn Ile Met Asp  
100 105 110

Thr Trp Glu Ser Asp Ile Lys Tyr Tyr Glu Asn Tyr Leu Tyr Asp Lys  
115 120 125

Ser Leu Val Val Gly Arg Tyr  
130 135

<210> 28

<211> 133

<212> PRT

<213> sulfolobus acidocaldarius

<400> 28

Trp Ile Lys Glu Ala Glu Asp Gly Lys Val Tyr Phe Leu Leu Gln Val  
1 5 10 15

Asp Tyr Asp Gly Lys Lys Ser Arg Ala Val Cys Lys Leu Tyr Asp Lys  
20 25 30

Glu Gly Lys Lys Ile Tyr Ile Met Gln Asp Glu Ser Gly His Lys Pro  
35 40 45

Tyr Phe Leu Thr Asp Ile Asp Pro Asp Lys Val Asn Lys Ile Thr Lys  
50 55 60

Val Val Arg Asp Pro Ser Phe Asp His Leu Glu Leu Ile Asn Lys Val  
65 70 75 80

Asp Pro Tyr Thr Gly Lys Lys Ile Arg Leu Thr Lys Ile Val Val Lys  
85 90 95

Asp Pro Leu Ala Val Arg Arg Met Arg Ser Ser Leu Pro Lys Ala Tyr  
100 105 110

Glu Ala His Ile Lys Tyr Tyr Asn Asn Tyr Val Tyr Asp Asn Gly Leu  
115 120 125

Ile Pro Gly Leu Ile  
130

<210> 29

<211> 133

<212> PRT

<213> Sulfurisphaera ohwakuensis

<400> 29

Trp Ile Lys Glu Ala Glu Glu Gly Lys Ser Tyr Phe Leu Leu Gln Val  
1 5 10 15

Asp Tyr Asp Gly Lys Lys Ser Lys Ala Ile Cys Lys Leu Tyr Asp Lys  
20 25 30

Glu Thr Lys Lys Ile Tyr Ile Leu Tyr Asp Asn Thr Gly His Lys Pro  
35 40 45

Tyr Phe Leu Thr Asp Ile Asp Pro Glu Lys Val Asn Lys Ile Pro Lys  
50 55 60

Val Val Arg Asp Pro Ser Phe Asp His Leu Glu Thr Val Ile Lys Ile  
65 70 75 80

Asp Pro Tyr Ser Gly Asn Lys Ile Lys Leu Thr Lys Ile Val Val Lys  
85 90 95

Asp Pro Leu Ala Val Arg Arg Met Arg Asn Ser Val Pro Lys Ala Tyr  
100 105 110

Glu Ala His Ile Lys Tyr Phe Asn Asn Tyr Ile Tyr Asp Leu Gly Leu  
115 120 125

Ile Pro Gly Leu Pro  
130

<210> 30

<211> 132

<212> PRT

<213> Sulfolobus solfataricus

<400> 30

Trp Leu Glu Glu Ala Gln Glu Asn Lys Ile Tyr Phe Leu Leu Gln Val  
1 5 10 15

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Asp Tyr Asp Gly Lys Lys Gly Lys Ala Val Cys Lys Leu Phe Asp Lys  
20 25 30

Glu Thr Gln Lys Ile Tyr Ala Leu Tyr Asp Asn Thr Gly His Lys Pro  
35 40 45

Tyr Phe Leu Val Asp Leu Glu Pro Asp Lys Val Gly Lys Ile Pro Lys  
50 55 60

Ile Arg Asp Pro Ser Phe Asp His Ile Glu Thr Val Ser Lys Ile Asp  
65 70 75 80

Pro Tyr Thr Trp Asn Lys Phe Lys Leu Thr Lys Ile Val Val Arg Asp  
85 90 95

Pro Leu Ala Val Arg Arg Leu Arg Asn Asp Val Pro Lys Ala Tyr Glu  
100 105 110

Ala His Ile Lys Tyr Phe Asn Asn Tyr Met Tyr Asp Ile Gly Leu Ile  
115 120 125

Pro Gly Met Pro  
130

<210> 31

<211> 133

<212> PRT

<213> Pyrodictium occultum

<400> 31

Lys Pro Leu Glu Ala Arg Asp Gly Val Glu Gly Phe Leu Leu Gln Thr  
1 5 10 15

Met Tyr Asp Gly Glu Arg Gly Val Ala Ala Ala Lys Ile Tyr Asp Asp  
20 25 30

Arg Asn Gly Ile Val Tyr Val Tyr Phe Asp Arg Thr Gly Tyr Met Pro  
35 40 45

Tyr Phe Leu Thr Asp Ile Pro Pro Asp Lys Leu Gln Glu Leu His Glu  
50 55 60

Val Val Arg His Lys Gly Phe Asp His Val Glu Val Val Glu Lys Phe  
65 70 75 80

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Asp Leu Leu Arg Trp Gln Arg Arg Lys Val Thr Lys Ile Val Val Lys  
85 90 95

Thr Pro Asp Val Val Arg Val Leu Arg Asp Lys Val Pro Arg Ala Trp  
100 105 110

Glu Ala Asn Ile Lys Phe His His Asn Tyr Ile Tyr Asp Tyr Gly Leu  
115 120 125

Val Pro Gly Met Lys  
130

<210> 32

<211> 138

<212> PRT

<213> Aeropyrum pernix

<400> 32

Val Arg Glu Pro Trp Val Glu Ser Val Arg Gly Tyr Leu Leu Asp Val  
1 5 10 15

Arg Tyr Asp Gly Ser Leu Gly Lys Ala Val Leu Met Leu Tyr Asp Pro  
20 25 30

Ser Ser Gly Ser Leu Val Lys Trp Ala Asp Arg Thr Gly His Lys Pro  
35 40 45

Tyr Phe Leu Thr Asp Ala Arg Pro Glu Asp Leu Arg Ala Ala Gly Val  
50 55 60

Asp Val Ser His Asp Glu Ser Phe Leu Gln Tyr Asp Leu Val Glu Lys  
65 70 75 80

Phe His Pro Ile Asp Arg Lys Leu Val Lys Leu Tyr Lys Ile Val Val  
85 90 95

Ser Asp Pro Leu Ala Val Arg Arg Leu Arg Glu Lys Val Ser Ser Ala  
100 105 110

Gly Phe Ser Val Trp Glu Ala Asp Ile Lys Tyr His His Asn Tyr Ile  
115 120 125

Phe Asp Arg Gln Leu Ile Pro Gly Ile Leu  
130 135

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<210> 33

<211> 14

<212> PRT

<213> Unknown

<220>

<223> amino acid motif where X can be any amino acid

<400> 33

Glu Xaa Xaa Ile Xaa Phe Tyr Xaa Xaa Xaa Tyr Xaa Xaa Asp  
1 5 10